

J. W. S. Playfair
with J. W. Walkers very
Kind regards



See page 70.

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ON

THE LARYNGOSCOPE

AND ITS

CLINICAL APPLICATION.

BY

THOMAS JAMES WALKER, M.D.(LOND.),

SURGEON TO THE PETERBOROUGH INFIRMARY AND DISPENSARY;
FORMERLY ASSISTANT-PHYSICIAN TO THE QUEEN'S
HOSPITAL, BIRMINGHAM; ETC.

*Reprinted from the BRITISH MEDICAL JOURNAL, and
MEDICAL TIMES AND GAZETTE.*

LONDON:

T. RICHARDS, 37, GREAT QUEEN STREET.

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THE LARYNGOSCOPE AND ITS CLINICAL APPLICATION.

It was the late Mr. Liston, one of the most eminent of our British surgeons, who, more than twenty years ago, first suggested the use, in diseases of the larynx, of the instrument to which I wish to direct the attention of our associates; and the researches as to the physiological and pathological importance of the laryngoscope, pursued of late years with such good results in Germany and Franco, received their impetus from a memoir read before the Royal Society, published in 1855 in the *Philosophical Magazine and Journal of Science*, by M. Garcia, Esq., a resident in England.*

Notwithstanding these facts, it cannot be denied that the great majority of medical practitioners in this country know little more of the laryngoscope than that

* This paper was sent up to the JOURNAL six months since; but, owing to unavoidable delay on my part in procuring the engravings, the publication has been postponed to the present time. Since it was written, Mr. Yearsley and others have pointed out that the late Mr. Avery had invented and constructed a laryngoscope in the year 1846. I purposely avoid entering into the controversy as to priority of invention and application of this instrument. I may mention that Dr. Merkel of Leipzig, in his work on *The Functions of the Pharynx and Larynx*, states that an artisan named Lelligues, a patient of Trousseau's, was the first to construct a laryngoscope, and used it on himself, about the year 1833.

such an instrument exists; and not a few were ignorant even of this fact, until the recent sojourn of Professor Czermak in London, and his demonstrations at several of the hospitals, were remarked upon in some of our weekly medical journals. Had the class of diseases, in the diagnosis and treatment of which this instrument yields such important aid, been constituted in this age of subdivision into a medical specialty, no doubt many medical men would have been found who, having persevered, and conquered without aid the difficulties which naturally attend the first efforts to employ an entirely new instrument, would have gladly made known by demonstration and otherwise to their brethren and to the public, that they were possessed of means which enabled them to treat with peculiar advantages that class of cases to which they specially directed their attention. The fact that the laryngoscope has not at once come into general use, will not be taken as an indication that it is wanting in practical value, by those who remember how long it was before the stethoscope made its way into the hands of the great bulk of medical men, or will consider how few there are among the members of our profession, who have made themselves sufficiently acquainted with the use of the ophthalmoscope to be able to employ it in practice, and yet its value in the diagnosis, and consequently the treatment of eye-diseases, is undoubted; and as regards this instrument, we must bear in mind that it is the subject of special courses of instruction, and that ophthalmologists have written treatises, by the assistance of which any one of us may understand its practical application. My own experience, however, with the ophthalmoscope, with which I in vain endeavoured to gain any useful information until I received from an accom-

plished master of its use a few practical hints, indicates, I think, the true reason why the laryngoscope is at present so little employed, although it might be readily applied with great advantage in cases which occur constantly in the practice of every medical man. It is, then, the want of clear practical directions as to the clinical application of the larynx speculum which has led to its neglect; and it is this want which I shall endeavour to supply in this and subsequent papers on the same subject.

Having, during the summer and autumn of 1860, availed myself of the opportunities afforded during a sojourn in Vienna, to observe the practice of Stoerk, Semeleder and others, and having since that period been in the habit of employing the laryngoscope in my daily practice, I can confidently state that the difficulties spoken of by those who are practically unacquainted with the use of the instrument, are in a great measure chimerical; indeed, at this moment I cannot recall a single case of laryngeal disease in which I have wished to avail myself of the instrument, and have failed to obtain a view of the part affected. Let the practitioner persevere until he has learned to illuminate the pharynx, and hold the mirror in such a way as to display the larynx in the most tolerant of subjects; and he will then find that no more than very ordinary skill on his own part, and no extraordinary steadiness on the part of his patient, are requisite to his acquiring most valuable information from the laryngoscope in pathological cases. I have alluded to the stethoscope and the ophthalmoscope in comparison with this instrument; I may now state, that accurate observations may be made with the laryngoscope, with an exercise of far less study and far less skill, than that required by either of the former instru-

ments. With this encouragement to those who, following the directions I shall give, will endeavour to explore these regions which have hitherto been hidden from our eye, I shall proceed at once to describe, first shortly, the principles of the laryngoscope; secondly, the instruments we employ; thirdly, the appearance of the normal parts when viewed by aid of these instruments; fourthly, the exact mode of applying the instruments, directions for which will be much more intelligible after the laryngeal image has been described than earlier; and lastly, I shall give cases illustrative of the pathological conditions in which these instruments are of value.

I.—PRINCIPLES OF THE LARYNGOSCOPE.

The principles on which the laryngoscope is constructed and applied require but little explanation; they require for their comprehension no complex knowledge of optics; the only law that we must bear in mind being that when a ray of light is reflected from a plane surface, the angle of reflection is equal to the angle of incidence. A small mirror mounted on a long handle, having been previously warmed in order that the watery vapour expired from the lungs may not condense upon it, is held in the pharynx on a level with the soft palate, in such a position that the rays of light which it receives through the open mouth are reflected down into the larynx and trachea. An image of the parts so illuminated is formed in the same mirror, and is seen by the eye of the observer placed opposite the mouth, without the aid of lenses or any other medium. This image, of course, appears to be placed at the same distance behind the mirror as the object reflected actually is in

front of it; and it is of the greatest importance when we are making and recording our observations in pathological cases, that we should remember that the image represents the parts in an inverted position. Although I should have imagined that any one giving the subject the least consideration would have comprehended at once the relation between the various parts of the larynx itself and of its reflection in the mirror, there appears so much confusion in the writings of some of the foreign laryngoscopists, that I introduce the accompanying diagram to make the matter clearer.

If the mirror were held in a vertical position at the back of the throat, the image of the larynx would be inverted antero-posteriorly, and the most anterior part of the larynx, the epiglottis, would be the furthest from us in the image; but, with the mirror in this position, the image would be out of the view of the observer. If, again, the mirror were held horizontally, an equally impracticable position, an image would be formed, in which the epiglottis would be immediately over the true epiglottis at the most anterior part of the image, and the arytenoid cartilages immediately over their actual position at the hindermost part of the image. The mirror being held, however, in a position intermediate to these, an image is formed in which the parts, instead of being arranged from before backwards, are seen in a vertical plane; the most anterior part of the larynx, the epiglottis (*a*), being at the highest part of the image, and the arytenoid cartilages (*b*, *b'*) being the lowest. The antero-posterior version that is talked of does not, therefore, actually take place; and certainly, as we pass the mirror back into the fauces, the parts come into view as they are situated in the larynx, the epiglottis first, and then

the other parts in the order in which they lie, back to the arytenoid cartilages. The lateral inversion is that which requires most consideration; but it will, I think, be at once intelligible on reference to the diagram, in which A represents the larynx under observation, B



Fig. 1.—A. Anterior view of larynx; *a*. Epiglottis. B. Opening of larynx as inverted in mirror; *a*. Epiglottis; *b b'*. Arytenoid cartilages; *r* and *l*. Right and left vocal cords.

the image of the same as formed in the mirror. Now, *r* the right and *l* the left vocal cord, are seen on the right and left sides of the mirror exactly opposite to

their true position (that is respectively on the *left* and *right* hand of the observer); but *r*, the true right vocal cord, is the left, and *l* similarly is the right vocal cord of the image, as we see if we turn the diagram upside down, and look at the image B as though we were looking at the front of the larynx and epiglottis; that is, if we suppose the image to be placed in the same position as the larynx A. The same inversion of course takes place of the right and left aryteno-epiglottidean folds, of the right and left arytenoid cartilages *b*, *b'*; and of all other lateral parts of the larynx. An ulcer or any other morbid appearance situated on the left vocal cord (*l*) of the larynx (A) appears to be on the right vocal cord of the image (B), although of course it is situated on the same side of the mirror as of the larynx under examination.

It is, I think, the confounding the position of the parts in the *mirror* with their position in the *image* which has led to the confusion in the description of the relations between the larynx and its image to which I have alluded. Experience is necessary to enable us at once to correct the false representation given in the mirror; but with this experience, we make the necessary corrections with almost as little consciousness of mental effort, as when we mentally convert the inverted image which is formed upon the retina into the true representation of the various objects which surround us in every day life.

II.—INSTRUMENTS EMPLOYED IN LARYNGOSCOPY.

THE instruments which I am now about to describe include not only the very simple laryngoscope itself, but also certain accessory apparatus, which is occasionally required to enable us to throw a sufficiently strong light on to the mirror placed at the back of the fauces; much of the success of laryngoscopic observations depending on the attention which we pay to the illumination of the pharynx. Though the same mirror which we use as a laryngoscope serves to reflect the image of the upper part of the pharynx and the nares, an additional instrument, which we may call a palate-spatula, is required for the examination of these regions; and a combination of this spatula and of the mirror into one instrument constitutes a rhinoscope. The most useful form of this instrument, together with other apparatus for the local treatment of laryngeal, pharyngeal, and nasal affections will be also described.

The laryngoscope is simply a small mirror, placed on a stalk attached to its margin at an angle of from 120° to 150° . The stalk is of metal for about three inches and a half from the mirror; the remainder being a small wooden or ivory handle about three inches long, into which the metallic portion slides. Usually the stalk is straight through its whole length of about six inches and a half, but made of flexible metal in order that it may be bent at the will of the operator; in the margin the laryngoscope is figured which I constantly employ, and I recommend an instrument with similar curves in the stalk as the most useful. (Fig. 2.)

The mirror itself admits of variety in form and size; Czermak and his pupils use commonly a square one with the corners rounded off and the stem attached at one of the angles; others employ an ovoid mirror, the



Fig. 2.—Laryngoscope mirror. (The engraver has incorrectly made the handle straight instead of curved, and has represented the angle between the mirror and the stalk too abrupt.)

stem being attached to the round end of the oval. The most generally applicable form, however, is the circular; and with two mirrors of this form, one about an inch, the other an inch and a quarter in diameter, the

practitioner will succeed in examining the interior of almost any larynx.

In selecting the instruments, moreover, attention must be paid to the material of which they are formed. The mirrors are made of polished steel, and of glass coated with amalgam. The former material forms an excellent reflector as long as it remains bright, and is, perhaps, less obnoxious to damage by heat than the latter; but it requires great care to prevent its rusting, and it too readily parts with its heat; on the whole, therefore, a mirror made of thin glass coated with carefully prepared amalgam, and backed with German silver or some similar material, is best. Careful preparation is requisite, or the amalgam becomes cracked from the frequent exposure to heat to which the instrument is subjected. A certain amount of solidity is necessary; otherwise the mirror, cooling too rapidly when placed in the fauces, becomes dull from the deposit of moisture upon it.

This is the only instrument essential to obtaining a view of the interior of the larynx, when circumstances admit of our having the sun's rays falling direct on to the back of the fauces; it is seldom, however, that their direction is satisfactory without the aid of some simple reflector to turn them from their normal course. The most excellent illumination is obtained by placing a looking-glass about eight inches square on a table or the window-sill, about a foot or so below the level of the patient's mouth, and at a few feet distant from him, sloping at such an angle that it catches the sun's rays, and reflects them on to the back of the pharynx in a line corresponding with the axis of the buccal cavity, when the head is held erect, and the mouth opened as

widely as possible. Although, for reasons which I shall give directly, the illumination of the fauces by the sun's rays is much to be preferred, it is evident that, unless we are able to apply the laryngoscope under other circumstances than those of sunshine and a convenient window facing the sun, etc., the instrument is of but little practical value. Garcia employed only the sunlight in his observations ; and it was Czermak who first conceived and carried out the idea of concentrating diffused daylight and the light from a lamp, so as to make it available for illuminating the larynx. There are two distinct plans for concentrating the light : the first, when the patient is placed with his back to the source of light, the rays from which falling upon a concave mirror placed in front of him are thus concentrated and reflected into the pharynx ; the second, where the lamp is placed in the front of the patient, and the light passes through a lens or other concentrating medium direct into the mouth of the patient. The concentrating apparatus of Czermak consists of a slightly concave glass mirror, about three inches in diameter, and having a small hole in the centre of it, through which the observer looks, when the mirror is held before the eye. This mirror may be supported in the hand, as is the ophthalmoscope ; but it is much more conveniently attached to the head in some method. Czermak at first used it attached to a strap which he buckled round the forehead ; but he now employs the mirror set on a short metallic stalk, which is fixed by a screw to a short piece of wood, the mouth-piece, held between the teeth at such a height that the hole in the centre is on a level with the pupil of the eye. None of our associates should be tempted by the circumstance that this contrivance bears Czer-

mak's name, to choose it as the one they will employ. Even those with perfect teeth will find the fatigue of holding the jaws firmly closed, the interference with speech, and other inconveniences, sufficiently great to check them at the very outset of their laryngoscopic researches. Much more convenient than this apparatus is that of Semeleder, in which the mirror is attached to a spectacle-frame by a stiffly working ball and socket joint; in the eyes of the spectacle-frame, glasses can be inserted to suit every sight. A plan, which I suggested in 1860 to a Viennese instrument-maker, which has since been carried out, is to have the mirror attached by a ball and socket joint to a spring which fastens on to the head; one pad having the mirror attached pressing on the forehead, the other resting at the back of the head as in a fencing mask.

In all of these instruments the mirror is of glass coated with amalgam and backed with metal; it is slightly concave, so that the most brilliant illumination is obtained when the object is placed about eighteen inches in front of it. In using this mirror the patient is placed to the side and a little in front of the lamp or other source of light, the rays from which, passing by his shoulder, strike the mirror in front of the eye of the observer, and are concentrated by it in the pharynx. Much to be preferred, for reasons which I shall subsequently give, to this mode, of illuminating the fauces by reflected light, is that in which, the light from a lamp or candle being placed in front of the patient, its rays are concentrated and fall directly on to the fauces, without the use of a reflector to alter their direction. This was the plan adopted by Dr. Stoerk of Vienna, and also by Tuerck; the concentrator they employed being a globe

of glass about six inches in diameter, and filled with water.

The engraving (Fig. 3) shows the mode in which I have had this fitted into a frame of metal, which is much

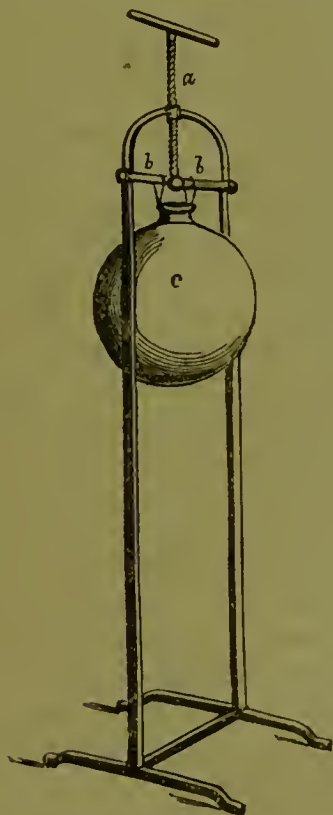


Fig. 3.—Apparatus for concentrating light.

more convenient than the cumbersome wooden affair used by Stoerk. By means of the screw (*a*), the cross-bar (*b, b*), and with it the globe (*c*), which constitutes our lens, is raised or depressed. This globe must be

placed close to and immediately in front of the lamp placed on a table behind the observer. A very brilliant light is thus obtained, which is most concentrated at about twenty inches from the globe, but is sufficiently bright to light up the larynx, both much nearer to and at a greater distance from the globe; of course, by altering the relative heights of the lamp and the concentrator, we can cause the rays of light to fall higher or lower as we please. The objection to the use of this concentrating lens in place of a reflector is simply that it is too cumbersome to carry about with us to our patients' houses; we may, however, often replace it, when the examination does not take place in our own consulting-rooms, by a plain water-bottle, which, when filled and raised to the level of the lamp and placed in front of it, on a box, or books, or something equally within reach at the majority of houses at which we visit, is an efficient substitute for the globe and frame.

The practical advantages of the direct illumination of the fauces as compared with that by means of a reflector attached to the head of the observer are very great. In the first place, the illuminating apparatus being altogether independent of the body of the operator, he can, as long as he does not bring his head immediately in front of the lamp, move his head and body as may be required, and he can bring his eye nearer to, or remove it further from, the object he is examining, as he wishes. On the other hand, with the reflector attached to the head, the observer cannot move without withdrawing the light from the fauces, and he cannot bring his eye nearer than about eighteen inches to the pharynx without diminishing the intensity of the illumination; and, since the part of the larynx which he is examining is

still further from him than the laryngoscope, it must be beyond the range of ordinary accurate vision—a circumstance which interferes seriously with the observation of minute points of difference in structure, colour, etc. Secondly, even supposing that the reflector did not labour under the disadvantages just alluded to, there is the fact that the same flame will give, with the concentrating apparatus to which I give the preference, a much more brilliant light than when concentrated by the reflector.

The inconveniences attached to reflectors for illuminating the larynx, have induced Dr. Moura-Bourouillou, the author of a work on *Laryngoscopy*, to employ a concentrating lens of glass. This is about two inches in diameter, and has its principal focus at about three inches distance. It is attached to a lamp by means of a collar of copper, on which it is supported by an arm having two joints. The lamp, of course, in employing this instrument, is placed in front of the patient as with the globe of water above described; but the focal distance of the lens being so short, not only the concentrating lens, but the lamp itself, must intervene between the mouth of the patient and the eye of the observer; hence a screen is necessary to prevent the bright light of the lamp from interfering with the view of the larynx seen beyond it; this is attached to the collar of copper on the opposite side to that to which the arm supporting the lens is fixed. Although I have no practical experience of this instrument, it appears to me that it possesses many disadvantages as compared with the globe concentrator which I have described. A perfect apparatus would be a glass lens properly mounted, the focal distance of which should be the same as that of the globe of water, which should condense the light to

an equal degree, should be as cheap, more portable, and altogether more convenient than the apparatus I have described. Although I have thought it right to mention the several modes of illumination employed by those who are devoting special attention to the laryngoscope, I recommend only certain instruments for purchase by those who wish to pursue the examination of the larynx.

As I have already said, the brightest image is obtained when the sun's rays are thrown into the larynx. For examination with such light, we require simply our laryngoscope, and a common looking-glass to change the direction of the rays. The sunlight failing us, we should employ the glass globe of water, supported in a convenient frame. And, lastly, in cases where we can neither employ our own globe of glass, nor extemporise a similar condenser from a water-carafe, we must avail ourselves of a concave reflector, which should be either that attached to the spectacle-frame of Semeleder, improved as it has been by our own and the Parisian instrument-makers, or that attached to the spring crossing the head, as suggested by myself.

All the instruments I have described are available alike for the examination of the larynx, and of the upper part of the pharynx and the nares; the face of the laryngoscope in the examination of the latter being, of course, turned upwards instead of downwards. As, however, the uvula and soft palate would prevent our seeing the mirror, unless they were artificially held out of their natural position, the little instrument figured in the margin (Fig. 4) becomes necessary. This consists of a broad leaf-like portion turned up at the end, and a stalk, both of metal; the stalk

being fixed in a wooden handle. Its use is to raise the uvula and soft palate; and no better example can be given of the difficulties which must be encountered, in



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Fig. 4.—Spatula for raising the uvula and palate.

Fig. 5.—Caustic-holder.

their attempts to apply the instruments practically, by those who derive all their knowledge of the laryngoscope from the instrument-makers, than the fact that the traveller from one of the principal London instrument-makers carried this palate-spatula about with him, exhibiting it as an instrument for depressing the tongue.

When we are examining the nares, this little instrument is held in the left hand, while the right is occupied with the mirror. Consequently we are not able, when using these instruments, to apply caustics, or adopt any operative proceduro, in the regions disclosed to us. I have seen several models of instruments combining the palate-spatula and the mirror in such a manner that both may be worked with one hand, leaving the other at liberty for whatever manipulations may be requisite in the treatment of the diseased conditions revealed by the rhinoscope, as an instrument combining the mirror and palate-spatula is called. The best rhinoscope which I have yet seen is that of Stoerk; and I am at present getting a model made by Mr. Matthews of an improved form of this instrument, which will, I hope, prove of real practical value.

In the local treatment of the various affections of the larynx and pharynx, many instruments are required which it is unnecessary to describe; but, one of the chief advantages derived from the laryngoscope being the power it gives us of applying caustics with accuracy to the interior of the larynx, no description of the laryngoscopic apparatus would, I think, be complete which left unnoticed the proper form of caustic-holder. Several forms of this instrument have been proposed; and I have employed those of Stoerk and of Leiter. (The latter of these were to be seen, with a large collection of laryngoscopic instruments, in Leiter's case, in the Austrian Court of the International Exhibition; the instruments which I use and recommend are exhibited by Mr. Matthews of Portugal Street.) Both of these, however, have faults in their construction, which have induced me to endeavour to improve upon them; and the

instrument here figured (Fig. 5) is the one which Mr. Matthews has invented and constructed, embodying all the suggestions which I made to him as to what was requisite to make the instrument as nearly perfect as practicable. The stalk of the instrument being slender, and at the same time rigid, we are able to direct the caustic accurately to the point desired, without so completely obscuring the image in the mirror as when we employ Stoerk's instrument; and, the extremity of the instrument being expanded, it admits a much larger piece of caustic than any of the foreign instruments I have seen, which will scarcely contain a piece larger than the fenestrum through which it is applied, so that there is a risk of the caustic falling into the trachea. I have made the absolute security of the caustic a *sine quâ non* of this instrument. The caustic, being concealed when we introduce the instrument into the larynx, is pushed forward by the pressure of the thumb on a button at the end of the instrument; and, the pressure being taken off, it returns to its case by the elasticity of a spring, when opposite the point we wish to cauterise. The whole is perfectly manageable with one hand.

The ordinary sponge-probangs, mounted on whale-bone suitably curved, are of course not superseded by the instruments for holding solid caustics; and no set of laryngoscopic instruments is complete without one or two of these. On precisely the same principle as his solid caustic-holder, Mr. Matthews has constructed an instrument with a sponge for the application of liquids; and regarding, as I do, the solid caustic-holder of incomparably greater practical value, for its convenience and security, than any that has been previously con-

structed, I should recommend the instrument for applying liquids to those who wish to have every instrument they use neat and elegant, as well as useful.

Together with the instruments I have described above, Mr. Matthews has submitted for my inspection a pair of forceps, or perhaps one should rather describe them as tweezers, which, projecting from the end of a long tube constructed with rings, etc., as is the caustic-holder figured above, are closed by the pressure of the thumb, and open again by their own elasticity when the pressure is removed. These Mr. Matthews, no doubt, intends for the purpose of removing such small foreign bodies as a fish-bone, etc.; and for this purpose they might, I think, be very useful.

Certain instruments, which I have had constructed for the treatment of special cases, I shall describe in connexion with the cases themselves.

Those who are anxious to make a special study of laryngoscopy, and who are able and willing to devote much time to the study of the laryngoscope, cannot do better than study its application on their own persons. Autolaryngoscopy is quite possible by the aid of simply a small mirror held in the left hand, while the right is used for guiding the laryngoscope; but this practice is somewhat difficult, without the use of an apparatus especially adapted for it.

Although, from a fear of being tedious, I shall not here describe the instruments necessary for observing or demonstrating one's own larynx, I may mention the apparatus of Czermak, which is the one I have used. In this, by means of one mirror, the light from a lamp or the sunlight is reflected on to the laryngoscope held in the pharynx; while in another mirror, placed high

enough to admit of the light reflected from the first passing beneath it, the operator observes the image of his own mouth with the laryngoscope, and its reflection of the larynx. Another apparatus, which I have not yet seen, appears from the description given by its inventor, Dr. Moura-Bourouillou, at least as good as that of Czermak, simply for purposes of autolaryngoscopy. The pharyngoscope, as it is called, consists of a mirror which may vary from six to eight inches in diameter; this is pierced in its centre by a hole an inch and a half in diameter; and in this opening is placed a lens of glass; the whole is mounted on a frame, which may be fixed to a lamp in such a position that the lens is immediately in front of the flame, the back of the mirror being directed towards the lamp. The light concentrated by the lens falls into the open mouth of the observer; and he, holding the laryngoscope in the proper position, sees what it discloses, reflected in the mirror of the pharyngoscope. The illumination in this instrument, being obtained by concentrating the light instead of reflecting it, is probably better than that obtained by Czermak's apparatus; but for demonstration to others the pharyngoscope of M. Moura-Bourouillou seems to me very inferior to Dr. Czermak's laryngoscope for self-observation; and I should, therefore, advise those who wish to take the judicious step of applying the laryngoscope and studying the laryngeal image on their own persons, before practising upon others, to purchase the apparatus of Professor Czermak, directions for the use of which I will give when speaking of the modo of applying the laryngoscope. Previously to discussing this, I shall, in my next paper, describe the appearance of the parts brought into view by the mirror, as seen during life.

III.—APPEARANCE OF THE NORMAL LARYNX, ETC., AS SEEN IN THE LARYNGOSCOPE.

HAVING described at length the instruments which we require in order to obtain a view of the larynx, and to treat its morbid conditions, I think it well, before giving directions for their practical application, to call to the remembrance of our associates, the different parts of the larynx and pharynx, and to indicate the appearance which these present when viewed in their normal condition by aid of the laryngoscope. In doing this, I do not think it necessary to give a minute account of each fold or fossa observed, nor to discuss the physiological bearing of the various structures; but simply to give such a description as may enable the observer at once to recognise what he sees and to distinguish what is healthy from what is morbid.

The parts of which the larynx-speculum affords us a view are, the back of the tongue, the whole interior of the pharynx, the larynx with all its constituent parts, a part of the interior of the trachea, and a part of the nasal cavities.

On first introducing the instrument into the fauces, we meet with the image of the back of the tongue; and so little are we accustomed, when unaided by the laryngoscope, to examine this part of the body, that the V-shaped group of large circumvallato papillæ, and the generally irregular, almost warty, appearance of the surface of the base of the tongue, might be regarded as abnormal by the observer using the speculum for the first time. Even when the rest of the tongue is much furred,

the elevations and irregularities at this part of the organ are free from fur, and they then show more distinctly against the surrounding surface. The mirror being advanced a little further towards the back of the pharynx, the epiglottis (*a*) is brought into view; when the tongue

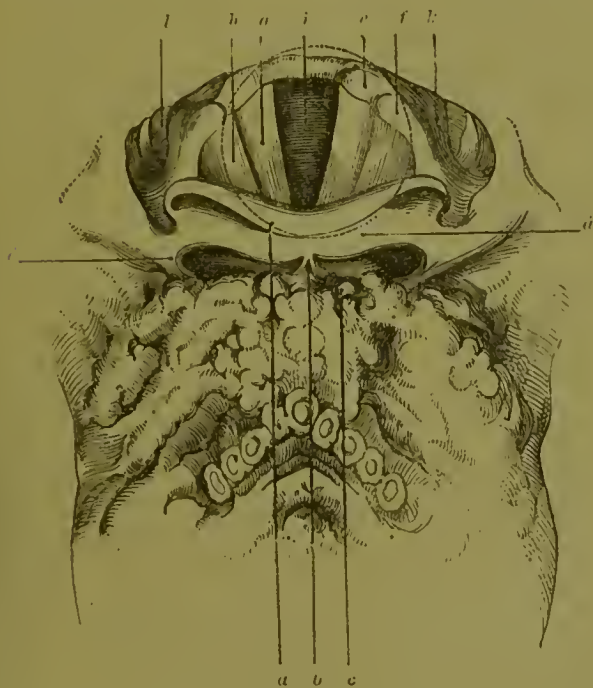


Fig. 6.—The base of the tongue and the larynx, etc. The dotted circle includes as much of the parts as is seen at one time in a moderately sized mirror. The engraving, with the exception of this ring, is taken from Türk.

Fig. 6.—*a* *á*. Epiglottis; *a*. Its free border; *á*. Its anterior surface; *b*. Glosso-epiglottic ligament; *c*. Vallecula; *d*. Folds connecting the epiglottis with the pharyngeal wall; *e*. Arytenoid cartilage surmounted by the cartilage of Santorini; *f*. Cartilage of Wrisberg; *g*. True vocal cord; *h*. False vocal cord; *i*. Rimæ glottidis; *k*. Outer surface of aryteno-epiglottic folds; *l*. Inner surface of wall of pharynx.

is drawn forward at the same time that the epiglottis remains in its usual position, we see that, stretching across the angle formed between the front of the epiglottis and the surface of the tongue, is the glosso-epiglottic ligament (*b*), which, passing from the centre of the base of the tongue back to the middle line of the front of the epiglottis, leaves on each side of it a deep fossa (*c*), named the vallecule; this groove is separated laterally from that in which the tonsil lies, by a band, more or less marked, passing from the base of the tongue, backwards and outwards, towards the hyoid bone. When the tongue lies quietly at the base of the mouth, its surface at the base and the anterior surface of the epiglottis are in contact, so that the vallecule, etc., are not seen.

Immediately behind these parts, and always constituting a prominent object in the mirror, is the epiglottis (*aa*). This portion of the larynx differs much in appearance in different subjects; it is at once recognised standing up from the root of the tongue, of a more or less decided yellowish tinge; the yellow colour being more marked at the border, which presents a curved outline, the convexity of the curve being directed forward at the centre, while at the sides it is in the opposite direction. It is in the greater or less degree of these curves, in the more or less pointed character of the centre of its border, in the extent to which it stands up from the tongue, and in the intensity of the yellow tinge, that the epiglottis differs in different individuals. Thus, without being abnormal, the free part of the epiglottis may present the appearance of a thin, yellow, sinuously curved lamina, stretching from side to side of the fauces; or of a pink, thick, almost

conical process, standing up at the centre of the back of the tongue. These differences in form appear to be independent of the character of the voice.

The position of the tongue and of the larynx, as well as the action of the muscular fibres connected with the epiglottis, regulates the amount of its surface, anterior or posterior, which we see. It is most difficult to get a view of the posterior surface; and almost always, in our first examinations of the larynx, it is the anterior surface (*a*), with the frænulum or glosso-epiglottic ligament, which we catch sight of in the mirror; but by asking the patient to utter a high falsetto note, and in some cases without this, we may get a view of the posterior surface. This surface of the epiglottis is smooth; and may be described in general terms as convex from above down, concave from side to side; although Dr. Czermak has called attention to the fact alluded to in the minute descriptions of some of the old anatomists, that the curve from above downwards varies slightly in its course from the base to the summit of the epiglottis. Dr. Czermak has also pointed out the existence of a small prominence in the middle line, at the base of this surface; and whether this nodule have the physiological importance which he ascribes to it or not, it is as well that those inspecting the interior of a larynx should be aware that this nodule, when seen more or less developed, indicates nothing pathological.

The epiglottis (*a*) forms the anterior boundary of that part of the laryngeal wall which stands up free in the pharynx; the arytenoid cartilages (*e*), with the aryteno-epiglottidean folds containing the cartilages of Wrisberg (*f*), constituting the remainder of this portion. This part of the larynx lies within the expanded *alæ* of the

thyroid cartilage and the greater cornua of the hyoid bone, which are concealed in the pharyngeal wall; and it is supported on the cricoid cartilage, which lies imbedded in the surrounding tissues, so that only its inner surface can be seen without dissection.

The mucous membrane is reflected off the edge of the epiglottis towards the wall of the pharynx, expanding over the inner surface of the hyoid bone, thyroid cartilage, and pharyngeal muscles; while another fold, passing at a lower level backwards towards the arytenoid cartilages, and containing between its layers the fibres of the aryteno-epiglottideus muscle and the cartilages of Wrisberg, constitutes the aryteno-epiglottidean ligament.

Now, of these parts, that which next to the epiglottis usually constitutes the most prominent object in the laryngeal image, is the summit of the arytenoid cartilage surmounted by the cartilages of Santorini (*e*).

Even where the epiglottis is but imperfectly raised, these prominences may be seen on either side of the middle line, behind its upper edge; and they will probably be illuminated, even though an unaccustomed operator may not hold the mirror so as to throw into the interior of the larynx sufficient light for the display of the vocal cords.

It is hardly necessary to remind my readers that the arytenoid cartilages have the form of irregular three-sided pyramids, and are placed with their bases on the cricoid cartilages, while on their apices are situated the little cartilages of Santorini. As seen covered by the mucous membrane, these apices and the supplementary cartilages present the appearance of two rounded nodules, situated at the back part of the upper boundary, and constituting the apex of the somewhat triangular

upper opening of the larynx. These nodules are in contact or slightly separated, according to the active or passive state of the vocal cords; the mucous membrane covering the prominences is smooth and pink; the cartilage, however, in some cases, shining through, gives it a yellow tinge, and the peculiar form of the conical apex curving backwards and outwards, clearly shows itself. The position of the mirror being shifted a little, or the epiglottis being carried more forward, the rounded, smooth, pink, aryteno-epiglottidean folds, are seen stretching outwards and forwards (upwards in the image) to the margin of the epiglottis, and forming the two sides of the triangular opening of the larynx. The cartilages of Wrisberg (*f*), lying in the edge of these folds, immediately in front of the arytenoid cartilages, constitute, in some individuals, prominences no less distinct than those formed by the latter, while in others they are scarcely observable.

Although the parts situated external to this upper boundary are to be noticed and require description, it is to those situated deep within the space it includes, to the true and false vocal cords and the laryngeal pouches that our attention is usually directed. Of these objects, the most prominent and the most important are the true vocal cords (*g*). They are seen as two tense white bands, about a line in width, stretching from before backwards, seldom seen at first in their whole length; the anterior angle, formed where they meet at their insertion into the lower part of the angle of the thyroid cartilage, being demonstrable only when the conditions are most favourable for the examination of the larynx.

If the patient be breathing quietly when the vocal cords come into view, they are seen to diverge, as they

pass backwards to their insertion into the base of the arytenoid cartilages, so as to be separated posteriorly by an interval of half an inch or so. If the larynx be half closed, the vocal cord is seen to terminate in the prominent angle at the base of the arytenoid cartilage called the vocal process; and these vocal processes, in this state of the larynx, converging backwards, give to the rima glottidis the form of an elongated irregular lozenge. Our attention is, however, usually arrested by the vocal cords, when they are made to approach one another by the patient's uttering a vowel sound. Being thus made tense, they are thrown well out into the middle line, where there is, when the mirror is rightly held, the most brilliant light. Under these circumstances, they appear very distinct, of a bright white colour, and separated from one another by a narrow chink. If our patient is able to utter a prolonged high falsetto note, he can, by so doing, display his vocal cords very clearly in their whole length, parallel, and separated only by a scarcely perceptible fissure at their anterior part.

The mucous membrane covering the vocal cords is reflected from their under surface on to the cricoid cartilage and trachea; and, of course, neither the under surface of the cords, nor the part of the cricoid immediately below them, can be seen in the mirror held in the pharynx as I have described; from the upper surface of the cords, the mucous membrane is reflected on to the laryngeal wall, and about a line above them it forms a fold on either side called the false vocal cords (*h*); these projecting from the wall of the larynx but a short distance, still catch the light so as to be prominent objects in the laryngoscope; the mucous membrane is of the same pink hue at these folds as over the rest of the

larynx, the small proportion of fibrous tissue contained between their layers not showing through; the sulcus existing between the true and false vocal cords, called the laryngeal sinus or ventricle, remains dark and in shadow in the laryngoscopic image, and is thus recognised between the bright fold of the false vocal cord above, and the glistening, tense, almost white band, the true vocal cord, below.

In most cases where we get a good view of the larynx, we may, by a little dexterous management of the mirror, shoot a ray of light down through the rima glottidis (*i*) into the trachea, so as to render the mucous membrane lining it visible, with the cricoid cartilage and the tracheal rings showing white and prominent through the translucent membrane. Very rarely the whole length of the trachea is thus illuminated, and the openings of the bronchial tubes into which it divides may be seen. By shifting the mirror, different parts of the tracheal wall may be seen, and ulcers, or other pathological affections, may be discovered.

The great freedom and rapidity of motion possessed by the chordæ vocales, cannot fail to strike the observer on his first obtaining a view of the interior of the larynx; the mobility is best seen when the person subjected to examination forces a laugh or cough, or utters a succession of vowel-sounds.

The false vocal cords do not possess any amount of independent action, but they approximate and diverge slightly, according as the general shape of the larynx is altered. Thus, in uttering a high falsetto note, the whole larynx is compressed from side to side, elongated from before backwards, and, of course, the false cords are approximated; so also, in the act of retching, the

base of the tongue being depressed, the epiglottis stands very prominently up, and the sides of the larynx appear to approximate; in swallowing, it is probable that the false cords are also approximated, while, according to Czermak, the small fissure left between them is closed by the little nodule described as existing at the back of the epiglottis. These papers being, however, meant merely as a guide to the practical application of the laryngoscope, physiological questions are avoided, except when they bear directly on the use of the speculum.

I have already stated that the walls of the larynx, within which are situated the parts just described, stand up free in the pharynx. On either side of these, therefore, is a sulcus bounded internally by the outer surface of the arytenoid cartilages and aryteno-epiglottidean ligaments (*k*), externally by the wall of the pharynx (*l*); in the outer wall of this groove, shining through the mucous membrane, and forming a more or less decided whitish prominence, may be seen the greater cornu of the hyoid bone; this fossa is not unfrequently the site in which foreign bodies, as small pieces of bone, etc., lodge and cause much annoyance.

At the back of the arytenoid cartilages, the mucous membrane is continuous with that of the pharynx; and here is situated the opening of the œsophagus; but of this opening nothing is seen, it being, in the normal state, so firmly closed that the mucous membrane appears to be reflected from the base of the arytenoid cartilage on to the posterior wall of the pharynx.

There still remains to be described the appearance which the part of the pharynx situated above the level of the soft palate presents when, the face of the mirror being turned upwards, the posterior nares, orifices of the Eustachian tubes, etc., are seen reflected in it.

The practice of rhinoscopy, as the examination of these parts has been termed, is attended with many more difficulties than the examination of the larynx; and, in an ordinary case, it is hardly possible to get so full a display of the parts as that given in the accompanying engraving, which is an accurate representation of the appearance which they presented in a case where, the soft palate being completely divided, special facilities for their observation existed. I have, however, drawn the palate as though undivided and raised by a spatula; since, the bright end of the palate-spatula (*f*) being one of the first of the objects reflected in the mirror which catches the eye of the observer, a clear conception of its relation to the surrounding parts will assist him in adjusting the mirror so as to bring these into view.



Fig. 7.—View of the posterior nares, the eustachian tubes, etc., as seen during life in the laryngoscope.

Fig. 7.—*a*. Posterior border of septum nasi; *b*. Middle spongy bones; *c*. Inferior spongy bones; *d*. Orifice of Eustachian tube; *e*. Superior spongy bone; *f*. Palate spatula; *g*. Soft palate.

It is quite the upper part of the pharynx, with the expanded portion of the septum (*a*) formed by the base of the vomer, the two middle spongy bones (*bb*), and

the nasal cavity between them, which, when the mirror is held in the middle of the pharynx, are first and most readily seen. It is more difficult to get a good view of the lower spongy bones (*cc*), and of the lower portion of the vomer, which parts are in shade from the prominence of the soft palate. The openings of the Eustachian tubes (*dd*) can be seen by sloping the mirror to one or other side.

The idea which we should form of the appearance of these parts from an examination in the recent state after death, or still more the idea formed from a knowledge of the skeleton in this region, is found to be very inadequate when we examine the nares during life.

The posterior edge of the septum narium (*a*) is seen now as a brightly illuminated pink column gradually tapering from the roof of the nostril to the floor, the lower portion receding between the prominent expansions of mucous membrane over the lower turbinated bones. At its upper and widest part, the septum is slightly grooved in the middle line; and here the mucous membrane appears whitish, from the vomer showing through. On either side of the septum are seen the rounded prominences of mucous membrane (*bb*) which project from the middle turbinated bones; they have a smooth shining surface, with a bluish tinge; and minute vessels are seen ramifying over them. The two are not absolutely symmetrical in size or form; they almost completely fill the upper part of the nares, and project back to a level with the border of the septum. Situated below these, and so close upon them that no view of the interior of the middle meatus is obtained, are the corresponding expansions over the lower spongy bones (*cc*); they are more flattened from above downwards, elon-

gated laterally; they present a similar smooth rounded surface, with a slightly blue tinge, to that already described on the middle bones; they project further back into the pharynx than these. Situated more deeply in the superior meatus may be sometimes seen the small fold of mucous membrane corresponding to the superior ethmoidal spongy bone (*e*). These parts occupy almost completely the space of the posterior nares; but between them and the septum and floor of the nose are seen the dark spaces into which they divide the nasal cavity. The direction in which the light is thrown and the position of the mirror prevent our having a direct view into these, and cause the meatuses to appear in the engraving rather smaller than they actually are.

Situated in the lateral wall of the pharynx, immediately below and to the outer side of the attached edge of the lower turbinated process, is, on either side, the orifice of the Eustachian tube (*dd*); these are irregular oval orifices, looking downwards and inwards, measuring, in their longest diameter, from two to three lines; the upper and posterior edge of the trumpet shaped opening of the Eustachian canal being bevelled off, we see the inner surface of the anterior lip, buried in the pharyngeal wall, apparently of a lighter colour than the surrounding mucous membrane, and having a yellow tinge communicated by the cartilage beneath it. In its course backwards and inwards to the ear, the tube causes a rounded prominence of the mucous membrane, as represented in the drawing. From the side of the pharynx at this point, the mucous membrane is reflected on to the soft palate; and a prominent fold exists at the lower edge of the orifice of the Eustachian

tube, beneath which lie the fibres of the levator palati muscle. Of the objects I have mentioned, not only those situated at the uppermost part of the pharynx, but also the orifices of the Eustachian tubes, may be easily illuminated in any case where we find a palate capable of tolerating the spatula necessary to raise it; the mirror having its face directed laterally, to throw the light on to the parts situated out of the middle line. The lower part of the vomer and lower turbinated bone are, however, thrown into shadow by the soft palate (*g*) and the end of the spatula (*f*) with which we raise the uvula and draw the velum forward.

Of course, by using a small mirror and turning it to one side or the other, we may get a view of any part of the pharyngeal wall, and thus detect ulcers, morbid growths, and other abnormal conditions; but there is nothing more seen in the normal state of the parts which requires description.

IV.—DIRECTIONS FOR USING THE LARYNGOSCOPE.

IN order to render my description of the mode of applying the instruments for examination of the larynx and pharynx as practical as possible, I have thrown it into the form of short rules, which will, if followed precisely, at once enable the practitioner to obtain a view of the parts.

A. *For Examination of the Larynx by Unconcentrated Sunlight.*

1. Place your patient, seated quite upright, on a chair of convenient height, facing a window or door through which the sunlight enters.

2. On the window-sill, or on a table between the patient and the window, place a small looking-glass at such an angle, that it shall reflect the sun's rays on to the lower part of the patient's face.

3. Your patient still sitting upright with his head inclined a little backwards, you direct him to open his mouth as widely as possible, and to put out his tongue; you will now perceive whether, from nervousness or from not understanding what is wanted, your patient keeps the tongue in contact with the roof of the mouth; if he should do so, direct him to draw a full breath through the mouth; and, if necessary, let him, while looking at his own throat in a looking-glass, study the proper mode of displaying his fauces.

4. Now alter the position of the looking-glass which reflects the light, until the sun's rays strike on to the soft palate, the shadow of the tongue just falling on the

posterior border of the velum. As soon as the light is adjusted, your patient closes his mouth until you are ready to proceed with the examination.

5. Seat yourself opposite your patient and to his right hand, your eye about on a level with his mouth, and the light passing by your right shoulder.

6. Warm the laryngoscopto in the flame of a spirit-lamp, or in warm water conveniently placed at your right hand, and test its temperature on the back of your own hand or on your cheek, so as to avoid burning your patient's mouth.

7. Your patient opening his mouth as widely as possible, and putting out his tongue, take hold of this, with a napkin or handkerchief to prevent it from slipping, between the thumb and forefinger of your left hand, and draw it downwards and forwards, being careful not to use so much force as to hurt the frænulum against the lower teeth, and avoiding, also, the placing your fingers or any part of the napkin in such a position as to throw a shadow on to the fauces.

8. Introduce the laryngoscope, held between the two first fingers and thumb of the right hand, quietly into the mouth, following the curve of the back of the tongue and the palate, and touching nothing until you reach the velum.

9. The hand being steadied by resting the ring and little finger against the cheek, press the back of the laryngoscope gently and steadily flat against the uvula and soft palate and raise this, the mirror being held just far enough back to avoid touching the posterior wall of the pharynx, and its face being directed, not to either side, but downwards and forwards.

10. Simultaneously with the introduction of the mir-

ror, direct your patient to draw a deep breath, or to say *a* in a prolonged high tone ; thus you give him something to occupy his attention, and also cause him to open up the fauces and the larynx as much as possible.

11. If the preceding rules have been strictly adhered to, in any ordinary case, the epiglottis will certainly now be seen. Should it appear quite at the lower edge of the image seen in the laryngoscope, the instrument is not introduced far enough into the pharynx, and its position must be shifted accordingly.

12. The patient is again directed to utter the vowel sound *a* or *ah* in a prolonged note and a high tone ; and now the summit of the arytenoid cartilages with the cartilages of Santorini, constituting two rounded nodules, should be seen behind the epiglottis ; and probably deeper down, between these and the epiglottis, the vocal cords will appear. If, however, the parts behind the epiglottis be not visible, and this portion of the image appear dark, the inclination of the mirror must be altered, so that the rays of light may be thrown into the larynx.

13. It may be that no part of the image in the mirror is obscure from want of light ; but, the front and edge of the epiglottis occupying the most anterior part of the mirror, immediately behind it is seen the posterior surface of the pharynx. In this case, the inclination and elevation of the laryngoscope being altered, the deeper parts may be brought into view ; but the main reason why the larynx is not seen, is that the epiglottis actually overshadows it ; therefore, draw the tongue more forcibly forwards, and direct your patient to utter a falsetto note, to force a laugh or cough, and thus endeavour to alter the position of the parts.

14. Whenever the introduction of the instrument causes retching, withdraw it, and let your patient compose himself before you reintroduce it. The operator will best insure the patient's tolerance of the examination, by dexterously avoiding the touching any part of the pharyngeal wall; by pressing firmly against the velum, not touching it lightly and tickling it; by occupying the patient's attention, and directing him to take a deep inspiration, to utter a vowel-sound, to cough or to laugh, as recommended in Rule 10, whenever any tendency to retch is observed. It will, however, very seldom be found, except in the case of young children, that intolerance of the instrument in the throat prevents our getting a satisfactory view of the larynx; the great difficulty usually is, that the epiglottis intercepts the view.

15. A view of the vocal cords, arytenoid cartilages, and epiglottis, having been obtained, incline the face of the mirror to one or other side, and thus bring into view the parts situated further from the middle line, and which have been described in Part III of these papers.

16. Be careful lest, in looking into the mirror, the head be placed between it and the source of light; the right eye can be brought close up to the mouth without placing the head in such a position as to cast its shadow on the mirror. Keep also the handle of the laryngoscope, and the hand which supports it, well towards the left side of the mouth; otherwise, they will interfere with the illumination of the mirror.

B. For Examination of the Larynx by Direct Concentrated Artificial Light.

1. In a darkened room, place your lamp on a table, a little way from the edge, and at such a height that the flame shall be near the level of your patient's mouth when he is seated on a chair. Immediately in front of the lamp, place your globular condenser.

2. Seat your patient upright in a chair, with his face directed towards and exactly opposite to the lamp and concentrator, and distant from the latter from eighteen to twenty-four inches, the light being brightest within this range.

3. Your patient's head being placed in position as directed in Rule 3 of Section A, adjust, by means of the screw, the level of the concentrator, until the light falls on to the soft palate.

The remaining rules, as to the position of the operator, the introduction of the mirror, and so on, are the same, whether we employ the sunlight or concentrated artificial light.

c. For Examination by Artificial Light Concentrated by Reflection.

1. Place your patient with his back towards a table, near the edge of which you place the lamp or other source of light, in such a position that the light shines over his left shoulder; or, where a lamp is not procurable, the patient being seated in a chair, you may get an assistant to hold a candle just over his left shoulder.

2. Now seat yourself opposite your patient, attach the frame supporting the reflector to your head, and adjust

it so that the light is thrown on to the patient's face.

3. Having made the patient open his mouth and expose the fauces, as previously directed, move your own head nearer or further from him, until you ascertain that the back of the pharynx is in the focus of the concave reflecting mirror.

The remaining steps of the examination are precisely the same as in the examination by direct light, which method is, wherever practicable, to be preferred to that of examining by the light concentrated by the reflector; in the latter case, it must be borne in mind that the operator has, as I have already pointed out, to contend with the following disadvantages. 1. The light obtained is actually not so bright as that obtained by the globular concentrator. 2. The operator cannot move his head to either side without removing the light from the fauces and laryngoscope; nor nearer to or further from the object he is looking at without diminishing the intensity of the illumination. 3. The operator's eye is necessarily at a greater distance from the laryngoscope, than is suited for distinct vision; and instead of having it uncovered, except by such spectacles as may be necessary to assist any defect in his own sight, the operator is compelled to look through a small orifice covered by glass.* In fact, complications are added in this mode of illuminating the fauces, which render the successful examination of the larynx comparatively difficult.

* Dr. G. Johnson has adopted the plan of placing the concave reflector on the forehead instead of in front of the eye of the operator, which is thus left uncovered. Dr. Johnson's or Mr. Mason's reflector, as manufactured by Mr. Matthews, though greatly inferior to the globular concentrator, is, I think, to be recommended before Semelceder's, or any other reflecting apparatus.

D. For Examination of the Posterior Nares, Eustachian Tubes, and Upper Part of the Pharynx.

Either of the modes of illumination described above may be adopted ; and the first rules as to the position of the patient will vary accordingly. The light being so arranged as to fall on the mouth of your patient, proceed as follows.

1. His head being inclined back somewhat, let your patient, without protruding his tongue, open his mouth as widely as possible ; if he be able to keep the tongue lying quietly at the bottom of his mouth, so that the fauces are freely exposed, the depressor is not required ; but when the back of the tongue fills up the mouth too much, let the patient hold an ordinary tongue-depressor so as forcibly to depress the unruly member.

2. Now adjust the light so that it falls well on to the fauces, the shadow of the lower teeth falling lower than that of the tongue when this is drawn forward in examining the larynx.

3. Direct your patient to let all the muscles of the throat rest in an absolutely passive state. Any attempt on his part to open up the fauces will cause the elevation of the soft palate against the posterior wall of the pharynx, and will effectually prevent your seeing the parts situated in the upper part of the pharynx. The uvula and soft palate must hang passively forward ; and if there is any tendency on the part of a patient to hold them otherwise, it is absolutely essential for the success of the examination that this tendency should be corrected. Make your patient, therefore, clearly understand what you wish him to avoid doing ; and let him, watching the

movements of his throat in a looking-glass, persevere until he has learned to control them.

4. Now, with the left hand, introduce the palate-spatula, previously warmed in a spirit lamp, and its temperature tested on your own skin; and with the broad blade gently and steadily raise the uvula and velum, at the same time drawing them forward, and keeping them steadily in their altered position by resting the little and ring fingers of the hand holding the spatula against the patient's cheek. The contact of the spatula with the posterior border and upper surface of the soft palate always produces a disagreeable sensation, and may cause the involuntary raising of the velum against the posterior wall of the pharynx; if so, the patient must be allowed to observe in a looking-glass the introduction of the instrument, and must endeavour to bring this reflex action under control.

5. The soft palate and uvula being raised and drawn forward, and the tongue either lying passive at the bottom of the mouth, or being held there with a tongue-depressor by the patient, introduce the small laryngoscope (the mirror should be bent, so as to be nearer a right angle with the stalk than it is when used for the examination of the larynx), previously warmed, into the pharynx, with its reflecting surface turned upward; hold it immediately below the level of the soft palate, close upon, but not in actual contact with the back of the pharynx, and depress the handle until the plane of the mirror is much nearer the vertical than the horizontal position.

6. Some part of the posterior nares—probably the superior portion of the vomer and the middle spongy bones—should now be seen; if the upper part of the

pharynx appear dark, the inclination of the speculum must be altered until it throws the light upon the nares; if we cannot see the cavity of the upper part of the pharynx at all, the view is probably obstructed by the velum being in contact with the posterior wall of the pharynx, and thus shutting off the whole of its upper part in the manner to which I have already alluded: even should the soft palate, in the first instance, be drawn well forward by the spatula, it is apt to be involuntarily raised by the patient while the attention of the operator is directed to the introduction of the speculum; and this involuntary occlusion of the upper part of the pharynx will frequently prove an obstacle to successful rhinoscopy altogether insurmountable.

7. The vomer and middle turbinated processes being brought into view, alter the inclination of the mirror, and direct its face to either side, so as to bring the orifices of the Eustachian tubes, the lower spongy bone, and other parts, into view.

As no rhinoscope—that is, an instrument combining the palate-spatula and the mirror in such a way that they may be managed with one hand—has at present been constructed of a sufficiently perfect form to be practically useful, I give no directions as to the mode of using this instrument; but it is evident that, both hands being occupied in the management of the mirror and the spatula, in the usual mode of examining the posterior nares, we cannot, while the parts are in view in the mirror, apply caustic, or adopt any other measure towards the treatment of the malady we are observing. This does not, however, render the use of the palate-spatula and speculum as above directed of no practical value; for the information gained by an ocular examin-

ation of this region may guide our general treatment, and also enable us to apply local means with more certainty than where we have never seen the part.

Although an expert in the use of the laryngoscope will rarely fail, if he follow the rules I have given, to gain satisfactory information as to the state of the larynx; a novice, having no experience of the small difficulties which may prevent a successful examination, will probably require to make several attempts before he acquires the dexterity in the manipulation of the instrument and the management of the patient, which he must possess in order to obtain such a clear and satisfactory view of the parts as will enable him to recognise them distinctly, and to determine their healthy or morbid condition. It is but fair to his patients that a practitioner should acquire this experience upon his own person and not upon theirs; and this he may readily do, either with or without the use of a special apparatus for self-observation. Of these special instruments, I have already alluded to the autolaryngoscope of Czermak and the pharyngoscope of Moura-Bourouillou.

In using the former, the apparatus is placed upon a table, opposite to which the practitioner is seated, with the small plane mirror fixed at a convenient distance from the face, at such an inclination that when his head is in position the observer can readily see the soft palate. The concave reflector should be about eighteen inches from the face, and placed at a lower level than the plane mirror, so that the reflected and concentrated light may pass unobstructed below this to the pharynx. The lamp is placed on one or other side, between the observer and the reflector, with one side of the chimney darkened or shaded by a screen, so that the direct light may be shut

off from the face and eyes of the person placing himself under examination. The illuminating apparatus being thus arranged, the practitioner will proceed with the examination of his own larynx, according to the rules given under the heading A, for examination of the larynx of another by unconcentrated sunlight.

It is, however, quite possible to make observations on one's own larynx without any additional apparatus to that required for the examination of others, beyond a small plane mirror two or three inches square, which is held in the left hand in such a position that, while it does not obscure the free access of light to the fauces, the operator can see in it the face of the laryngoscope introduced into the mouth by his right hand. For self-examination in this method, we may use either the light of the sun, which was the source of illumination employed by Garcia, in the series of observations, the publication of which gave the first impulse to the study of laryngoscopy; or artificial light concentrated by the globe condenser; or even unconcentrated artificial light. The latter will, however, be found very inconvenient.

For Self-Examination by the Sunlight. I should give the following rule. Place yourself and your reflecting mirror, or let an assistant place you, in the relative positions recommended for your patient and the mirror in the rules given under Section A; then, having your left elbow supported on a book or other convenient prop, placed on a table immediately in front of you, hold in the left hand a small plane mirror at such a height that the light passes beneath it to your fauces, and at such an angle that you have a good view of the face of the laryngoscope when placed in your throat. In the introduction of the laryngoscope, you follow the same rules

as those given for its use on others ; although, of course, the instrument must be held differently, and the fingers of the right hand cannot be steadied against the cheek.

For Self-Examination by Artificial Light and the Globe Condenser. Place yourself opposite the lamp in the position recommended for your patient under Section B, and let an assistant adjust the light until the fauces are brightly illuminated, the left elbow resting upon the table ; in your left hand, hold the small mirror over the lower part of the globe, so that the light passes to the throat above it, and incline it, with its face directed a little upwards, so that by turning the eyes down you may see the fauces and the laryngoscope. This will be found the most convenient method of observing one's own larynx and demonstrating it to others when we do not possess the apparatus of Czermak or Moura-Bourouillou ; of the latter I can say nothing from personal experience, and I, therefore, add nothing to what I said of its use, when describing it in Part III of these papers.

Since the preceding paragraph was written for the pages of the BRITISH MEDICAL JOURNAL, I have added to the globe-condenser, as described in Part II, a small plane mirror, which is attached by an arm to one side of the frame supporting the globe. This addition renders the instrument the most convenient auto-laryngoscopic apparatus extant ; and I should not, therefore, now recommend the purchase of any special apparatus for this purpose, either that of Czermak or any other. The directions given above for self-examination with the globe-condenser without the addition of the mirror, apply equally to the improved instrument, except that the mirror in which the observer sees the laryngoscope

reflected being attached to the stand, is simply placed in the position I have recommended, and fixed there by a thumb-screw; instead of being supported in the left hand, which is thus left at liberty.

All the above rules I have myself constantly tested by practically applying them, and I have demonstrated their efficiency to others on more than one occasion. In order to carry out with success the directions given, a certain amount of tact and neatness of hand is requisite, but not more than every well qualified practitioner should possess; certainly not more than he will acquire by a little perseverance in the use of the instrument, and by careful attention to the minute practical points which I have endeavoured to embody in my rules.

I do not hesitate to recommend the methods of examination which I have placed first in order, in preference to that by artificial light concentrated by reflection, which I have placed third; but I have given rules for examination by the reflector equally distinct with those for illumination by direct light, as I would recommend any one of my readers who expects to have to use the laryngoscope constantly, and does not mind the additional expense of another instrument, to obtain Dr. Johnson's reflecting concentrator, and to accustom himself to examining the larynx, etc., by each of the three methods of illumination.

V.—CASES ILLUSTRATING THE PRACTICAL VALUE OF THE LARYNGOSCOPE.

DOUBTLESS there will recur to the recollection of every experienced practitioner, who has now made himself acquainted with the facility with which a view of the larynx can be obtained, cases which have occurred in his own practice, in which he would gladly have availed himself of the means of diagnosis and treatment which the laryngoscope affords, had he at the time that the cases were under hand been acquainted with the instrument; and it is, therefore, not my intention to do more now than to allude very shortly to a few cases illustrating the practical value of an instrument which, in its simplest form, should be in the hands of every practitioner.

The acute affections of the larynx are accompanied by such characteristic symptoms, that their diagnosis is usually comparatively easy without the aid of the laryngoscope; and in some of these maladies in which it might be desirable, the examination would not be practicable. Thus, doubtless, in cases of croup, it would be satisfactory were we able to define exactly the limits to which the false membrane extends; but the incidental circumstances of the disease, more especially the tender age of the patients in whom it usually occurs, almost necessarily preclude the possibility of our making use of the instrument: and again, in diphtheria, where it would frequently be a matter of much importance to ascertain the extent to which the air-passages are affected, the state of the fauces gives no chance of our seeing into

the larynx. In ordinary acute laryngitis, I have never at present made any use of the laryngoscope; but I believe that it would be quite applicable in any such case where we were anxious to obtain a view of the parts—as, for instance, to assist us in determining upon the propriety of resorting to the operation of tracheotomy. I do not believe that the inflammation of the pharynx, which frequently accompanies laryngitis, would cause any insurmountable intolerance of the laryngoscope, as I have used the instrument in very acute cases of pharyngitis, where the symptoms threw a suspicion on the larynx, and rendered a view of this part desirable, not only for my own satisfaction, but for that of my patients, who, in two cases, were medical men, and were only relieved from a nervous fear as to the state of the larynx, by having it thus made palpable to the sight.

Of the utility of the instrument in *œdema glottidis*, there can be no doubt; unless, indeed, those practitioners who are in the habit of examining the larynx with the finger believe that a digital is equally satisfactory with an ocular examination. The parts most seriously affected in this malady, are those situated high in the larynx, and therefore most easily seen in the laryngoscope. In the following case of a closely allied if not identical affection, the effusion affected so much the floor of the mouth, the root of the tongue, and the fauces, as to render the patient unable to open his mouth to any considerable extent; but even with this disadvantage, the eye saw certainly as far as the finger could reach, and the aid afforded by the laryngoscope in diagnosing the state of the larynx, was most satisfactory.

CASE I. W. G., aged 34, a groom, of fairly temperate

habits, and usually enjoying very good health, applied to me on February 1st, 1863. He had been quite well up to the previous day, when he began to feel pain and stiffness about the lower jaw and the fauces. When I saw him, the pain had increased; there was considerable difficulty in swallowing; the voice was changed, sounding thick, not husky; respiration was quiet. The fauces were reddened; there was fulness of the salivary glands below the jaw, and some difficulty in opening the mouth and protruding the tongue. An astringent gargle and wash for the mouth, with the application of a turpentine epithem externally, were ordered. On the evening of the same day, the pain and swelling having increased, and a feeling of suffocation having supervened, acetum lyttæ was applied externally, and an emetic administered.

February 2nd. The feeling of choking was somewhat relieved by the remedies employed on the previous night; but this morning, the œdema about the floor of the mouth was so considerable, as to give the appearance under the tongue of a double ranula. The tongue could not be protruded; the pulse was feeble and rapid; the skin relaxed. The laryngoscope, which was used with difficulty owing to the inability of the patient to open his mouth, showed the epiglottis reddened and somewhat swollen, and the back of the aryteno-epiglottidean folds scarcely affected. An incision was made on each side of the frænum linguæ into the cellular tissue of the floor of the mouth; the use of the astringent lotion continued; and fifteen minims of tincture of sesquichloride of iron administered in a mixture every four hours. Beef-tea and milk were ordered to be given in as large quantities as possible.

Evening. The œdema of the floor of the mouth was relieved by the scarification; there was still considerable pain in swallowing, and an occasional sense of choking and suffocation.

February 3rd. The symptoms depending on œdema were improving; but at the site of the incisions on each side of the frænum linguæ was a small superficial slough. The epiglottis was still comparatively slightly affected. The use of the chalybeate mixture was continued; and a lotion made with Condyl's disinfecting fluid was ordered for the mouth.

February 4th. The progress of the case from this date was, with slight fluctuations, gradually towards recovery. The small sloughs separated; and the œdema subsided. The laryngoscopy was daily employed; and at no time was the œdema of the epiglottis found at all considerable. By the time that the swelling about the mouth had sufficiently subsided to enable me to get a full view of the larynx, no trace of diseased action remained there; indeed, although I give the notes of this case, in connection with what I have said as to the utility of the laryngoscope in œdema glottidis, it can hardly be called an example of that malady, although closely allied to it.

Of the use of the speculum in other acute affections of the larynx, in injuries or in the passage of foreign bodies through the larynx into the trachea, I can give no examples from my own practice. The value of the laryngoscope is, however, greatest in the diagnosis and treatment of chronic affections of the larynx; and the instances are now numerous, where a patient having been treated during many years for various supposed affections of the larynx or of the general constitution,

a laryngoscopic examination has disclosed a totally unsuspected cause of the aphonia and other symptoms.

In all forms of *chronic laryngitis*, whether severe or slight, leading merely to congestion or to ulceration, the laryngoscope can be used with advantage; and the characteristic appearances of the various affections are exemplified in the following case.

CASE II. *Chronic Inflammatory Congestion accompanying Follicular Pharyngitis*. Miss C., aged 24, had for years suffered from dryness and occasional soreness of the throat, with frequent hacking cough and occasional sense of choking. Patches of redness, with distension of the mucous follicles, were observed in the pharynx. The laryngoscope showed the vocal cords healthy; but small congested patches, with dilatation of the minute vessels, were scattered over the mucous membrane, lining the interior of the larynx and covering the epiglottis. There was no thickening of the mucous membrane, nor any of the follicular distension which existed in the pharynx. In most cases of the follicular pharyngitis, accompanied by the usual symptoms, in which I have examined the larynx, its appearance differs but little from what is normal in the healthy organ.

The treatment in this case consisted in the application to the interior of the larynx of a solution of nitrate of silver (a scruple to the ounce), and the symptoms have been greatly relieved.

Tubercular Inflammation, and Ulceration of the Larynx. Examples of this malady are, of course, constantly occurring; and I have under my care cases, where the benefit derived from the local and general treatment is much more marked than in the following

case, which standing, however, first in my note-book, I give here.

CASE III. C. C., aged 36, a butcher, consulted me in 1861, when his case was evidently hopeless. He had for eighteen months suffered from symptoms of pulmonary phthisis, and for five months had been more or less hoarse. He was now much distressed by pain and choking when he swallowed either liquid or solid food. On examination, the epiglottis was found thickened, and the left side affected by ulceration, which had destroyed a considerable portion of its substance; the interior of the larynx was red and œdematous, and the vocal cords were thickened. The application of the solid nitrate of silver to the ulcerated margin of the epiglottis relieved the pain in swallowing, but did not, of course, prevent the rapidly fatal termination of the case.

In most cases of tubercular ulceration of the larynx, there is considerable inflammatory redness and œdema, either general over the whole larynx, or more decided at the points where the ulcers with the sharply defined edges which they usually present are situated; immediately around the ulcers there is thickening of the parts, probably from tubercular deposit, and occasionally patches of tubercle may be seen which have not yet ulcerated. Not unfrequently, the mucous membrane appears to be eroded from the vocal cords, without these being at all thickened by deposit; even where the vocal cords themselves are healthy, the œdema and deposit of tubercle about other parts of the larynx prevent the free action of the arytenoid cartilages and their vocal processes, and thus partly prevent the closure of the vocal cords, and give rise to the clanging voice or complete aphonia which accompanies the malady.

Syphilitic Ulceration of Larynx and Trachea. I have not at present examined, or met with any case of very acuto syphilitic inflammation, and most of the cases I have examined, have been characterised by the presence of comparatively small ulcers without much œdema or redness. I do not think it necessary to quote any cases, as the treatment I have adopted, has always been constitutional and unmodified by the laryngeal examination. In one case, that of M. S., aged 20, wife of a shoemaker, suffering from other symptoms of constitutional syphilis, I could readily see an ulcer about the size of a four-penny piece, situated on the left side of the windpipe over the upper rings of the trachea and the cricoid cartilage.

Malignant Disease of the Pharynx and Larynx. I have examined two cases of this kind laryngoscopically; in one, there was always such an accumulation of discharge about the parts, as to prevent my being able to say what was their actual condition. In the other, notes of which I subjoin, the laryngoscope certainly aided the diagnosis.

CASE IV. Mrs. M., aged 56, wife of a farmer, consulted my father and myself, in December 1860. She had for some time previously felt a pricking sensation in the throat, which led her to imagine that she might have swallowed a pin, which had got fixed in the gullet. She had now great difficulty in swallowing, and almost every attempt to eat caused a fit of choking. There were slight fulness and tenderness over the œsophagus, about the level of the cricoid cartilage. Laryngoscopic examination, made with some difficulty, from the extreme irritability of the fauces, showed irregular ulceration of the whole of the lower part of the pharynx, thickening and

ulceration of the interior of the larynx, the summits of the arytenoid cartilages being especially affected. There was not much inflammatory redness; but both the ulcers and surrounding parts were covered by a considerable amount of purulent discharge. The constant choking, which was a distressing symptom in the case, depended probably on the special affection of the mucous membrane covering the summits of the arytenoid cartilages; as, when the epiglottis is sound, ulceration in this particular situation seems the most frequent cause of that symptom.

Of course, in this case, the laryngoscope gave no aid in the treatment of the malady; and only enabled us to give with more confidence an opinion, at which, we should probably have arrived without its assistance. The hopeless view which we gave of her case to our patient, induced her to place herself in the hands of a practitioner of the homœopathic system of quackery, who held out hopes to which the patient clung almost to the hour of her death.

Tumours of the Larynx are now known to be far from uncommon; and since the introduction of the laryngoscope, several cases have been reported, but none of these illustrates more forcibly the great utility of the instrument, than the following, which I reported at length in the *Lancet*, of November 9th, 1861, and which was, I believe, the first case in which a polypus of the larynx was removed by any form of *écraseur*, with the aid of the laryngoscope. Recently, Dr. Gibb has reported cases in which he has successfully adopted a similar operative procedure to that which I employed; and from the claims he makes for his instrument, he appears to have overlooked the account of this case which I had previously published.

CASE. R. P., aged 14, smith's workman, was first seen by me August 12th, 1861. *History.* When he was six or seven years old he was first perceived to become hoarse and rather short of breath; and for the last six years he had never been able to speak but in a whisper. About eighteen months since, he became incapable of doing any but the lightest jobs, in consequence of the distressed breathing induced by exertion. Six months ago, he was compelled to give up work altogether; and for the last three months he had been unable to move across the room or to make the slightest exertion without help. He was of a highly strumous family, and had cicatrices from old strumous ulceration about the neck. He had been frequently under medical treatment; and, apparently, all the medical men who had had him under their care, had used remedies for chronic laryngitis, and had probably suspected phthisis laryngea. His countenance was anxious, pale, and bathed with perspiration; his lips livid; the pupils somewhat contracted; hands cold; respiration very laboured, all the accessory muscles being thrown into action, and each inspiration being accompanied by a loud laryngeal murmur; the least draught of wind blowing on the face stopped the breathing, and caused the greatest distress. The pulse was very rapid and small. His whole appearance was such that, before going into the history of the case, I got my instruments ready in case of tracheotomy being at once required. A laryngoscopic examination, made without the least difficulty, revealed at once the cause of the dyspnoea. The epiglottis and upper part of the larynx were normal, with the exception of slight oedema of the aryteno-epiglottidian folds; but growing from the anterior wall of the larynx, immediately above the anterior attach-

ment of the right vocal cord, was a polypoid growth, presenting an irregular mulberry surface, which, being of about the size of the tip of the little finger, and ten lines long, acted as a valve. At each inspiration, it was seen drawn down on to the rima glottidis, which it would completely close, were it not that the end of the growth was drawn slightly through the wide posterior part of the rima, so as to leave a small chink at the back through which air could enter. In expiration, the growth was thrown upwards, so that the exit of the air was not impeded. At the base of this, and occupying a similar position on the left side, was a small growth similar in character, and of about the size of a split-pea. The nature of the case being thus cleared up, and the friends of the patient stating that for about a week he had seemed in the same imminent danger as to-day, I decided to incur the risk of delay, and, if possible, to relieve my patient without tracheotomy. I accordingly wrote at once to Messrs. Weiss of London, a description of a pair of vulsellum-scissors, curved sufficiently to admit of their being used in the larynx, which seemed to me the most feasible instrument to remove the growth.

August 14th. The symptoms during the last two days having been very urgent, I endeavoured to relieve them by passing a tube through the rima into the trachea. To my surprise, however, when the tube was introduced, respiration seemed impossible; and, being compelled to withdraw the tube at once to avert suffocation, I found that the end of the tumour had happened to catch in the fenestrum, and that a piece of about the size of a pea had been torn off, and, becoming fixed in the tube, had completely obstructed it. This unexpected result of the introduction of the tube not only afforded very consider-

able relief to the patient, but also proved the great friability of the tumour, and induced me to have an instrument made by which a wire loop might be made to encircle the growth, and, being tightened, to crush through its base. This laryngeal *écraseur* consisted simply of a strong silver tube like Goode's double cannula, but longer, and curved at one end almost at right angles; the other extremity being furnished with two strong rings or loops; a piece of thin iron wire, such as is used for sutures, or, as I have since used it, a chain made of two such wires closely twisted together, is passed through one side of the tube and returned through the other, so as to leave a loop. One end of the wire is twisted into the eye at the end of the cannula, so as to fix it firmly, and to the other is attached a small cross-bar of wood. By pulling this end firmly, one has sufficient power to crush through and separate growths of a cellular nature, such as this proved to be.*

August 18th. The patient had seemed much better

* I am particular in describing this instrument, as Dr. Gibb, in the number of the *Lancet* for May 9th, 1863, describes a laryngeal *écraseur* which he has had constructed by Messrs. Weiss; and although he expresses himself as not unmindful of the instruments used on the Continent, makes no allusion to the fact that I had contrived and used an instrument (made for me by Messrs. Weiss) which in principle exactly resembles, although I believe it is a less manageable instrument than his. This omission, no doubt, arose from Dr. Gibb's having overlooked or forgotten the case which I published in the *Lancet* of November 1861; and I therefore at once wrote a letter for insertion in the *Lancet*, calling attention to the fact of my having described a laryngeal *écraseur* in the pages of that journal eighteen months before Dr. Gibb described his. That this letter should have been placed among the notices to correspondents instead of with the correspondence of the *Lancet*, does not appear to me to show any anxiety on the part of the editor to allow the public to put in force the sentiment, *audi alteram partem*, which he affixes at the head of the division "Correspondence" in that journal.

since the removal of the small portion of the tumour by the cannula. With the aid of the laryngoscope, I succeeded three times in catching the tumour in the *écraseur*, which I received from town this day; and each time I removed a portion of about the size of a pea, giving immediate relief to the patient, who, having for three months previously to the removal of the small portion of the tumour by the tube, been unable to walk across a room, was now, with assistance, able to walk some little way from the infirmary towards his own home.

August 19th. On calling to-day, I found my patient out walking a quarter of a mile from the house. Laryngoscopic examination showed that the larger growth was sliced off on a level with the lesser, leaving the whole of the posterior part of the rima free for respiration. I to-day failed altogether in seizing in the noose of my *écraseur* any part of the growth; the whole of the pendulous portion of the tumour being removed, and its wide base alone remaining.

August 24th. The patient was greatly improved in general health and strength, and respiring with ease.

For some time after this the treatment consisted in the internal administration of cod-liver oil, and the topical application at first of solid nitrate of silver, and afterwards of a strong solution of sulphate of copper; but the patient getting so well that he was able to work extra time—that is, from six in the morning until half past eight in the evening—I did not see much of him until he again applied to me in 1862, labouring under severe catarrh, and with some return of the laryngeal symptoms, which a laryngoscopic examination showed to depend upon a return of the growth, which was, how-

ever, this time much smaller, and was situated higher up, at the root of the epiglottis, just within reach of the finger. I again removed some portions with the *écra-seur*, and the patient himself scraped some portion away with his finger; the difficulty in breathing was quite relieved, but the voice remained husky. From this time, there has been no necessity for treatment, and the patient met me the other day, and very exultingly told me that he "could *halloo* quite well"; certainly his breathing seems as good as can be desired, but his "*halloo*" would not yet, I think, be of much service at the cover side.

Nervous Affections of the Larynx constitute another class in which the laryngoscope is absolutely necessary for a correct diagnosis, and consequently for suitable treatment. The following case, of which I have but very short notes, illustrates the difficulties which may surround a diagnosis, and the power of the laryngoscope to clear them away.

CASE. E. P., aged 40, wife of a farmer, was first seen at the Dispensary in July 1861. She was stout, of a pallid complexion, and had a history leading to a suspicion of a syphilitic origin of her symptoms. She complained now of rheumatic pains, especially in the left shoulder, of sponginess and tenderness of the gums, difficulty in deglutition, and respiration. The voice was nasal, and there was laryngeal wheezing in respiration, with a clanging cough. The symptoms and the history made it probable that there was some syphilitic inflammation or ulceration of the larynx; but a laryngoscopic examination showed the entire absence of any such malady, and the dependence of the symptoms upon some affection of the nervous system causing partial paralysis. The progress of the case confirmed this opinion. On

August 13th, she was no better; complained of deafness, swimming in the head, and sickness. On September 23rd, she was completely deaf; had noises in the head; her voice was very nasal. She had great pain in the head, accompanied with giddiness; the sight of the right eye was failing. Her general health was improving. The treatment at this time consisted in the internal administration of iodide of potassium, and counterirritation to the temples and the head. Slow improvement took place; and as her residence was at a considerable distance from the Dispensary, she took her discharge, partially relieved, on March 29th, 1862.

In the form of nervous aphonia, commonly termed hysterical, in like manner we might frequently suspect some organic lesion; but we have in the larynx-speculum a ready means of satisfying ourselves of the true nature of the case. As to the local treatment which the laryngoscope enables us to apply for these nervous affections, I need merely refer to Dr. Morell Mackenzie's very interesting paper, read at the annual meeting of the Association, as showing the practicability of the application of galvanism; although I confess my belief that, in the great majority of the cases there related, the benefit was derived more from the powerful mental impression caused by the operation, than from any special effect of the galvanism upon the local nerves or muscles.

I might readily multiply examples, from my own practice, of the utility of the laryngoscope in dealing with real or supposed affections of the larynx; but I think that already sufficient must have been said to excite a desire on the part of all practitioners, anxious to keep pace with the progress which medical science is making, to acquire a practical acquaintance with the simple instru-

ment which yields such great results, and I shall, therefore, merely add one case, illustrative of the benefit likely to be derived from the practice of rhinoscopy. As I have already stated in a former paper, the examination of the nares presents greater difficulties to be overcome than does that of the larynx ; in the subjoined case, however, I had but one interview with the patient, and yet was able to get a view of the parts. I have been baffled in several cases, in attempts to make a rhinoscopic examination, where, I believe, I might now succeed, owing to a little addition I have made to my globe condenser, whereby a patient is enabled during examination, to watch in a mirror the movements of the throat, and to keep them under control.

Ozæna. Necrosis of the Vomer. CASE. Miss G., aged 35, confectioner, consulted me in October 1862. She was of a strumous constitution, and had never been very strong, but for the last few years had been greatly distressed by the extremely disagreeable odour of her breath ; perceived, of course, more by others than by herself. She had also considerable discharge from the posterior nares, which she swallowed or hawked up. This was usually muco-purulent, occasionally bloody. Rhinoscopic examination showed the surrounding parts healthy, but the posterior edge of the vomer bare and white ; and a discharge, principally mucous, clinging to the spongy bones.

The treatment recommended, was the internal administration of cod-liver oil ; and the use two or three times daily of a lotion, consisting of Sir William Burnett's solution, diluted with about one hundred and forty parts of tepid water, to be sniffed up through the nostrils and spat out of the mouth.

I have not seen the patient since, but she has sent messages to me, expressing her great gratitude at being relieved from a complaint of so disagreeable a character. I may state that, I have adopted the same treatment in several other cases where fœtidity of the breath had been most abominable, and after trying other disinfectant and astringent lotions, I have invariably found Sir William Burnett's solution, greatly diluted, the most efficient.

Without occupying space by describing the cases, I may state that I have been able to detect syphilitic ulceration of the mucous membrane covering the spongy bones, incipient polypoid growth, and other affections of the pharynx and nares. In all these maladies, and also in those affections of the hearing dependent on abnormal conditions of the Eustachian tubes, the rhinoscope will, I am convinced, yield the practitioner valuable information.

Before concluding these papers, I wish to add, as an appendix to Part II, a description of an addition which I have lately made to my globe-condenser and stand; and which, I feel confident, renders this by far the most convenient illuminating instrument, not only for examining the larynx of a patient, but also for observing and demonstrating to others one's own larynx.

A small plane mirror, three inches and a half long by two inches and a half wide, is attached, by a stiffly working hinge, to a small horizontal arm four inches long; at the opposite end, this arm is attached by a sliding collar to the right hand pillar of the stand, a thumb-screw being adapted to fix it at whatever height we please. The small mirror must be raised or depressed according to the height at which we place the globe; its position when we

are using the instrument should be immediately below and partly in front of the bottom of the globe, and its face should be inclined upwards at a slight angle, so that the person under observation casting his eyes down can see the reflection of the fauces when his mouth is open. By this arrangement, the patient himself can, if it be thought desirable that he should do so, see his own larynx, at the same time that the practitioner observes it in accordance with the rules laid down in Part IV, section B, and at least two other individuals can, without crowding, by looking over the patient's shoulder into this mirror, see the parts equally clearly with the mirror, while another person, looking from before, his head being on the opposite side of the globe to that of the operator, can see directly into the laryngoscope. Thus, by using the mode of illumination, which, on other grounds, is so far superior to that by any of the reflectors, we are able, not only to get a view of the larynx ourselves, but to demonstrate it, at the same time, to the person under observation and to three other individuals, or, with a little crowding, to many more. Again, the apparatus so constructed is a more perfect and more convenient form for observing and demonstrating one's own larynx than that of Czermak, Moura-Bourouillou, or any other of the special autolaryngoscopic apparatus with which I am acquainted. The operator, seating himself in the position of the patient, clearly sees his fauces with the laryngoscope, all brightly illuminated, reflected in the mirror, and as many persons as can crowd their heads round his so as to look over his shoulder, may get the same view; while others, again, can look straight into the laryngoscope from the front. I would, therefore, recant the advice given at the con-

clusion of my second paper to those who wish to practise antolaryngoscopy, as to the purchase of Czermak's apparatus; my globe condenser, as now constructed, costing less, being more convenient, and answering, also, as the illuminating apparatus for the observation of others. The stand which I use myself was constructed for me in the country; but as I have several times had inquiries made of me as to where such an apparatus is to be procured, I have given the model to Mr. Matthews of Portugal Street.

I have now carried out the plan which I laid down for these papers in my introductory remarks; and although, from the difficulty of finding time for writing when busily engaged in other duties, I have allowed so long an interval of time to elapse between the appearance of the various parts, that they may give the impression of being detached and unconnected papers, they will, I think, when collected, be found to constitute a complete manual of the art of laryngoscopy. I have avoided as much as possible all superfluous or collateral matter, adhering strictly to what is implied under the heading, "The Laryngoscope and its Clinical Application".

In conclusion, I may state my hope that, as I was one of the few who first worked with the instrument in this country, I may, by means of our widely circulating JOURNAL, have contributed something towards placing the laryngoscope in the hands of the bulk of our profession.

THE READIEST METHOD OF LARYNGO- SCOPIC AND AUTOLARYNGOSCOPIC INVESTIGATION.

From the Medical Times and Gazette.

ALTHOUGH the reports of cases successfully diagnosed by aid of the laryngoscope, which weekly appear in the medical journals, prove that the value of this instrument is becoming known, and that the number of those working with it is steadily increasing, doubtless many members of our profession are deterred from making the attempt to employ the speculum in the diagnosis and treatment of laryngeal disease, by their ignorance of the instruments which it is actually necessary that they should obtain, and by their unwillingness to encounter the considerable expense which, from the numerous complicated instruments described as laryngoscopes, they believe to be requisite, before they are provided with the necessary means for obtaining a view of the larynx.

Although one object of this paper is to describe an instrument which, as I have now modified it, is an addition to those among which the would-be laryngoscopist finds himself so confused, I hope to be able to show that, with a very simple apparatus, and at a

comparatively small cost, the practitioner may not only have the power of investigating any diseased larynx which may come under his notice, but also may have the opportunity of acquiring, by practice upon himself, that manual dexterity and familiar acquaintance with the normal appearance of the parts which experience alone can give.

The actual laryngoscope is, as most of the readers of this paper probably already know, simply a small reflector, which is held in the back of the throat in such a position as to throw the light down into the larynx, and in which the larynx, when thus illuminated, is reflected, and its image seen by the operator. This mirror is manufactured of various forms and sizes; I am in the habit of using two sizes of the round mirror, one about an inch and a quarter in diameter, and this I employ whenever it is admissible; and another, the diameter of which is half an inch less, for examining the throats of children and others, when it is not practicable to use the larger one.

With the large mirror, a tolerable view of the larynx may be obtained, even on a dull day, by placing the patient opposite a large window, with his head in such a position that no shadow falls on the back of the palate, against which the mirror is held so as to reflect the diffused daylight down into the trachea; and the parts are still better illuminated by making the patient bring his mouth near to a bright gas jet or a lamp, and reflecting the light by the large mirror in a similar manner; but from neither

of these sources do we get a sufficiently bright light for illuminating the larynx with the small mirror, for the investigation of delicate changes of structure, such as are often met with, nor for examination of the larynx in those cases where, from circumstances incidental to the case, but a small proportion of the light employed can be thrown into the larynx. The most perfect illumination is obtained by allowing the sunlight to fall directly on to the patient's face, so that it shall reach the laryngoscope, when held in the back of the pharynx; or, if the sun is high above the horizon, by reflecting the rays on to the face from a common looking-glass placed a little below the level of the patient's mouth, on a table, window-sill, or whatever may be convenient; but, as sunlight is not always available, it is necessary that we should have some accessory apparatus for concentrating artificial light, when we are desirous of making a minute inspection of the larynx on a dull day.

This concentration is usually effected by means of a concave reflector; but after having used for some time the reflectors of Semeleder, Czermak, etc., and having tried the improved forms which Dr. G. Johnson and others have devised, and which are erroneously called their laryngoscopes, I unhesitatingly recommend the form of globe condenser represented in the engraving; and which, when mounted as I shall describe, in addition to many advantages which it possesses as regards its illuminating powers, constitutes the most convenient form of apparatus for demonstrating and observing the larynx either of a patient or of the operator himself. The engraving

(See *Frontispiece*) is taken from a photograph, and the various heads are represented in the position which they actually occupied when every one of the five persons, including the patient, had a full view of the interior of the larynx.

The part of the instrument which is essential for concentrating the light is the glass globe (*a*), which is about six inches in diameter, and is filled with water, thus constituting a powerful concentrating lens. (A little corrosive sublimate may be dissolved in the water to prevent the growth of confervæ on the interior of the globe, necessitating frequent change of the water.) This globe is supported in a steel frame about twenty-two inches high, being attached to a crossbar (*b*), which slides upon the upright rods (*cc*), so that it can be moved up and down, and fixed at any level desired, by means of the thumb-screws (*dd*). When the globe is placed immediately in front of a lamp, an Argand gas burner, or any other source of light, it concentrates the rays so as to throw a most brilliant light upon any object placed in front of it, the light being most brilliant at a distance of from twelve to twenty inches from the globe.

With the instrument thus constituted, and without the additional mirror which I shall now describe, I have long been in the habit of working. I have described its application in the *British Medical Journal*, and I have demonstrated its advantages over all the reflecting instruments to a large number of my medical brethren. These advantages are:—1st. That from a flame of the same size a more brilliant light is obtained with the globe-condenser, than with any of

the reflecting condensers commonly used. 2nd. That the apparatus being independent of the head of the operator, he is able to move and to bring his eye nearer to, or further from, the mouth of his patient, without interfering in any way with the illumination; whilst, on the other hand, with the reflectors which are attached to the head of the operator, there is but one position in which the operator must hold himself in order that the light may fall upon the face of the laryngoscope, any movement on his part withdrawing the light; nor, indeed, can the operator bring his eye nearer to the mouth of the patient, so as to observe more accurately the laryngeal image, without diminishing the intensity of the light. 3rd. The beam of light thrown on to the patient's face by the condenser is so wide, that he may move his head very considerably without withdrawing the face of the laryngoscope from the illuminated field. It is not, therefore, necessary to follow up the movements of the patient's head with the concentrating apparatus; the facility for doing which, when a mirror is used attached to some part of the head of the operator, is claimed for the method of concentrating light by reflectors, as an advantage by some of those who advocate this plan. But to the advantages which the apparatus thus possesses as a mere illuminating apparatus for the examination of the larynx of another, must be added the great one, that when constructed with the small mirror (*e*) [*vide* engraving], it constitutes the most convenient form of apparatus for autolaryngoscopy. A small plane mirror, three inches and a half long by two and a half wide, is attached

to a sliding arm (*fg*) by a stiffly-working hinge at the corner (*f*); this hinge allows of the mirror's being inclined at any convenient angle, while it can be placed higher or lower on the stand by sliding the supporting arm up or down the upright rod (*c*), and fixing it in the desired position by the thumb-screw (*g*). If this mirror is placed immediately in front of the lower part of the globe, and made to incline at a convenient angle, the person whose throat is under observation can, by casting his eyes downwards, obtain in it a perfect view of the laryngoscope, and the image reflected in it; at the same time, two or more on-lookers can, by placing their heads on a level with that of the person under observation, and looking into the mirror, get the same view of the fauces, the laryngoscope, and the laryngeal image, without in any way interfering with the view of the observer, who, seated opposite to the patient, holds the laryngoscope in position in the fauces, and looks directly into it through the open mouth of the patient. In the wood-cut, a fifth person is represented, who, like the operator, looks directly into the laryngoscope; and it is evident that several other spectators, without either interfering with the transmission of the light from the lamp, or interposing any part of their body between the mirror (*e*) and those who are looking into it, might place themselves in a position in which they could see into the patient's mouth, and get a view of the larynx. Now, as there is a certain amount of manual neatness and dexterity in the management of the speculum, as well as a practical acquaintance with the normal appearance of the

parts, required before a practitioner can, without much inconvenience to his patient and some trouble to himself, acquire all the information which the laryngoscope is capable of affording in a case, the importance of having an instrument which facilitates his acquiring these requisites by practice upon himself cannot be overrated. It is true, that with no other instrument but the throat-speculum and a dexterously-managed looking-glass, it is possible to obtain a view of one's own larynx; but, even to the practised laryngoscopist, this method presents difficulties, and these to the novice would appear almost insuperable.

I must refer my readers to the papers which I have published in the *British Medical Journal*, for rules for the examination of the larynx by direct sunlight, without the aid of any other instrument than the laryngoscope itself; but this is without doubt the readiest method of examination when sunlight is available—indeed, in nine out of ten examinations which I make, I employ no other instrument than the larger-sized laryngoscope, reflecting by it either the diffused daylight admitted through a window, a ray of sunlight thrown directly on to the patient's mouth from a small looking-glass, or at night the light from an ordinary gas-jet; but, in order that none of my medical brethren may be deterred from employing that which I regard as the readiest method for autolaryngoscopic examination, as well as, under certain circumstances, for the examination of others, from not fully comprehending the mode of employ-

ing the globe-condenser, I here subjoin some short rules, both for self-observation and the examination of others, by its assistance; and, as self-observation should be the first practice, I give directions for this first. It is better that the concentrated artificial light should be employed in a darkened room; but this is not absolutely necessary: thus, at the moment that the photograph was taken from which the engraving is copied, the light obtained from the lamp and condenser was so good, that a perfect view of the larynx was obtainable by all the observers, although the daylight was, of course, strong enough for the photographer's purpose.

Rules for Autolaryngoscopic Examination by the Laryngoscope and Dr. Walker's Globe-Condenser.

1. Place your lamp or other source of light upon a table, a little way from the edge, and immediately in front of it place the condenser and stand, the back of the small mirror being directed towards the lamp.

2. Seat yourself in front of the table facing the lamp and condenser; when upright in your chair, your face should be about on a level with the globe, and twelve to eighteen inches distant from it.

3. Now, by means of the thumb-screw (*g*) [*vide* engraving], fix the mirror just below the globe, and incline it at such an angle that, when seated erect with your mouth open, you can, by casting your eyes down, see in it the reflection of your pharynx.

4. Observing your face in the small mirror, you now, if necessary, alter the level of the globe-con-

denser, so that the bright stream of light shall fall on the lower part of your face. The adjustment of the level of the condenser is effected by loosening the thumb-serews (*dd*) with the right and left hand respectively, using them as handles to raise and depress the crossbar and globe, and tightening them when the globe is at its proper level.

5. Now open the mouth as widely as possible, and protrude your tongue (it may be necessary to draw the tongue forward with the finger and thumb, using a napkin to prevent its slipping). You will now perceive in the mirror (*e*) whether you have fully exposed the fauces, or whether the tongue is in contact with the roof of the mouth. If the fauces are not exposed, draw a deep breath through the mouth, and you will perceive that the tongue is immediately depressed, and a very little practice will enable you to keep it so.

6. The fauces being fully exposed, you will now alter the inclination of your head, or slightly readjust the level of the condenser, so that the light falls on to the soft palate, the shadow of the tongue just resting upon the edge of the velum. When the light is properly adjusted, you close your mouth.

7. Take the laryngoscope between the thumb and two first fingers of the right hand, warm it, and test its temperature on the back of your hand, lest you burn your mouth.

8. The mouth being now opened, and the tongue drawn forward with the finger and thumb of the left hand, protected by a napkin, all kept well out of the

way to avoid throwing a shadow on the fauces, you introduce the laryngoscope with its face downwards, and steadily press its back flat against the soft palate and uvula, raising these slightly, but being very careful to avoid touching the posterior wall of the pharynx. The laryngoscope must be held so that it may be introduced without bringing any part of the hand in front of the mouth.

9. Should the introduction of the instrument induce a tendency to retch, draw a deep breath, pronounce in a prolonged note the vowel sounds *a* or *ah*, and you will thus conquer this tendency.

10. Hold the mirror in the fauces with its face directed downwards and forwards, not to either side; alter its inclination, so as to bring the various parts of the larynx into view, while by coughing, laughing, or cachinnating and articulating vowel sounds in high and low notes, you cause the parts to vary their position, and study the actions which most readily bring into view the different parts of the larynx.

By referring to the engraving at the commencement of this paper, it will be seen that, by the directions given above, the observer is made to take the position which the patient occupies in the group there delineated; and should he be anxious to demonstrate his larynx to others, this can readily be done if they will arrange their heads, some of them round the globe-condenser, so as to look directly into the laryngoscope, and others round the observer's head, looking, as he does, into the small square mirror attached to the condenser.

In examining the larynx of a patient, it may not be desirable that he should himself see what is going on, in which case the little mirror will be turned so that he cannot see into it; but very frequently, and especially in the practice of rhinoscopy, it is desirable that the patient should be able to study the movement of his fauces and tongue, so as to keep them under control; and then the following directions must be followed:—

To Examine the Larynx of a Patient with the Laryngoscope and Walker's Globe-Condenser.

1. The lamp and condenser being arranged as directed for self-observation, seat your patient erect in a chair facing the lamp, with his head distant about eighteen inches from the condenser.

2. Adjust the mirror, so that the patient sees his opened mouth, and, if necessary, alter the level of the condenser as directed in the foregoing rules, so that the light falls upon the patient's mouth.

3. Seat yourself facing your patient, and at his right hand, so as to avoid coming between him and the light.

4. The patient's fauces being exposed and illuminated, according to the directions for self-observation, you take his tongue between the forefinger and thumb of the left hand, guarded by a napkin or handkerchief, and draw it forward, while with the right hand you introduce the laryngoscope, warmed, and its temperature previously tested on your own cheek, into the mouth. The instrument is to be held

between the thumb and the two first fingers, the little and ringfinger resting against the cheek of the patient, so that the mirror may be held steadily against the soft palate.

6. Carefully avoid bringing the head too much in front of the globe-condenser when you are looking into the laryngoscope, and carry the right hand well over to the left side of the patient, so that no part of it casts a shadow on to the fauces.

The directions given for self-observation will show the other points to be attended to in examining the larynx of a patient; and as I have already, in the papers published in the *British Medical Journal*, given more minute and complete rules for all points connected with laryngoscopic examination, excepting the use of the small mirror attached to the globe-condenser, I do not deem it necessary to repeat them here. The main points to which I wish to draw the attention of the readers of the *Medical Times and Gazette*, are:—

1st. That much useful information may be obtained as to the state of the larynx with no other instruments than the small round speculums, of which each laryngoscopist should have at least two sizes.

2nd. That the best and simplest means of concentrating artificial light for laryngoscopic purposes is, by the use of a small glass globe of water, such as my globe-condenser, a plain water caraffe, or some other substitute.

3rd. That the arrangement of the globe-condenser

figured in the engraving constitutes not only the most convenient instrument for concentrating light, but also is the best apparatus for the practice of auto-laryngoscopy, and for laryngoscopic demonstration.

4th. Consequently, that, in my opinion, a practitioner possessing two round laryngoscopes, the globe-condenser and a small palate spatula, for examining the posterior nares, Eustachian tubes, etc., which I have not here described, is provided with all the instruments, and these the best, necessary for observing his own larynx, and making himself master of the art of laryngoscopy; for observing the larynx, air-passages, etc., etc., of his patients; and for demonstrating these to others. Finally, I may add that, although some of the advantages which I claim for my method may not be allowed by those who have been long in the habit of employing the concave reflectors, there is one which is undeniable; namely, the comparative cheapness of the apparatus. Mr. Matthews, of Portugal-street, manufactures the stand, as I have described it, at a lower price than that at which any of the concave reflecting mirrors are sold, and at about a quarter of the price to which a laryngoscope, reflecting concentrator, and a special apparatus for self-observation, would amount.

